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## STUDIES OF AFRICAN LAND AND FRESH-WATER MOLLUSKS

### 3.—WEST AFRICAN *ACHATINAE* RELATED TO *ACHATINA BALTEATA* REEVE

BY J. BEQUAERT[1] AND W. J. CLENCH[2]

The West African (or Guinean) rain-forest subregion harbors a number of species of *Achatina* of a rather uniform yellowish brown to chestnut color, with or without faint chestnut or mahogany blotches. These species superficially are so similar that it is difficult to identify them from published descriptions and figures. Consequently they are frequently confused in collections and many of the published records are unreliable. Upon comparing these species, we find that each has a characteristic sculpture. This we attempt to describe in the subjoined key and notes, which, together with the enlarged photographs of the surface of the shells, should help in identifying adult specimens. It is frequently impossible to name with accuracy young shells in the absence of adults from the same colony.

Of the five species included in the key, *A. bandeirana* seemingly is restricted to Angola and the Lower Congo area; *A. rugosa* is a species of the Central and Upper Congo Basin; *A. balteata* appears to have a much wider range, extending from the mouth of the Gambia River to Benguela and the Middle Congo; *A. iostoma* is common in western Cameroon and and *A. hessei* is known thus far from the type locality only. It is noteworthy that the three last-named forms occur in the same geographical and ecological area, sometimes together in one locality. This precludes regarding them as races or subspecies, though the differentiating characters are rather slight. The possibility should be considered, however, that *A. hessei* may be only an extreme variation in sculpture of *A. iostoma.*

One new subspecies, *A. rugosa chapini*, is described in this paper.

In preparing these notes, we have used, in addition to the collections of the Museum of Comparative Zoölogy (M. C. Z.), material belonging to The American Museum of Natural History (A. M. N. H.), the Academy of Natural Sciences, Philadelphia (A. N. S. P.), and the Carnegie

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Museum of Pittsburgh (Carn. Mus.). We wish to thank the curators in these museums, Dr. Roy W. Miner, Dr. H. A. Pilsbry, and Dr. Stanley Brooks, for kindly sending us these specimens. All photographs, except figure 6, were made by F. P. Orchard.

1.—Sculpture of body whorl in adult shells consisting mainly of wavy interrupted lines, either vertical or spiral; if small beads are present, these are irregular, elongate and subordinate to the wavy sculpture.....2.

Sculpture of body whorl consisting of granular beads, arranged mainly in vertical rows; spiral lines obsolete or subordinate to the vertical arrangement of the beads.....3.

2.—Sculpture spiral, consisting mainly of fine wavy lines, the vertical sculpture of irregular growth-lines only.....*A. rugosa* Putzeys.

Wavy sculpture vertical, consisting of very fine axial lines cut at fairly regular intervals by superficial spiral lines; in addition, irregular growth-lines.
*A. bandeirana* Morelet.

3.—Beading fine, just visible with the naked eye, not felt by touch, and interrupted by many smooth or wrinkled patches; the vertical growth-lines coarser than the beads.....*A. balteata* Reeve.

Beading of medium strength, quite distinct to the naked eye and well felt by touch (individual beads nearly twice as large as in *balteata*), covering the body whorl uniformly, and arranged in well-marked vertical rows; the growth-lines not coarser than the beads.....*A. iostoma* Pfeiffer.

Beading very coarse, produced by deeply cut spiral and vertical furrows (individual beads about three times as large as in *balteata*).
*A. hessei* C. R. Boettger.

### **Achatina rugosa** Putzeys

Figure 1

*Achatina rugosa* Putzeys, 1898, Ann. Soc. Mal. Belgique, XXXIII, Bull. Séances, p. lxxxiii, Fig. 18 (type; forest of Micici, Manyema District, Belgian Congo). Dupuis and Putzeys, 1902, Ann. Soc. Mal. Belgique, XXXVI (1901), Bull. Séances, p. lx (the type locality is here given more definitely as the forest of the Wazimba country, on the right bank of the Lualaba River, to the northeast of Nyangwe). Pilsbry, 1919, Bull. Amer. Mus. Nat. Hist., XL, p. 76 (in part; not the specimens from Ngayu, which are *A. balteata* Reeve). C. R. Boettger, 1927, Abh. Senckenberg. Naturf. Ges., XXXIX, part 4, p. 357.

Specimens Examined.—Two specimens from the Belgian Congo, without more definite locality (A. N. S. P.). Two cotypes from Micici in the Wazimba Forest near Nyangwe, Belgian Congo (one from the H. W. Winkley Collection, the other received from the Dupuis Collection now at the Musée Royal d'Histoire Naturelle, Brussels.—M. C. Z.).

All four specimens are similar in shape and appearance and may have been part of the original lot.

The sculpture of *A. rugosa* is very characteristic. It is barely noticeable with the naked eye and its true nature must be studied with a strong lens or a binocular microscope. The whole surface of the body whorl in adult shells is covered with very fine and close spiral lines, which are cut at irregular intervals by slightly raised, vertical growth-wrinkles,

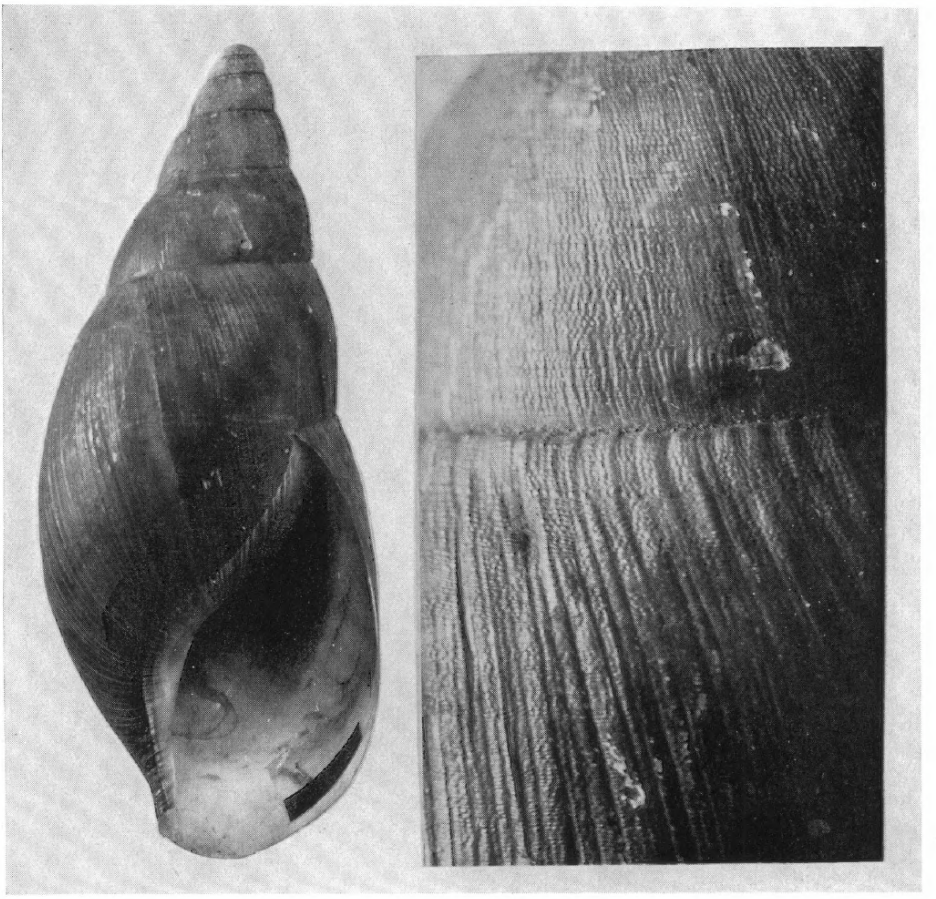

Fig. 1. *Achatina rugosa* Putzeys. Cotype, M. C. Z. No. 9296; Micici; natural size; and portion of penultimate whorl and upper half of body whorl, seen ventrally, enlarged × 4.

producing a peculiar wavy appearance. In the upper half of the body whorl some of the spiral lines are thicker and divided into transversely elongate knots or welts. On the earlier whorls this knotting is more regular and more evenly distributed, so that the surface is finely granular. The columella is long and narrow, with a short basal truncation.

Putzeys' figure was based on an unusually large specimen (134 mm. long, 62 mm. wide). Our specimens are all smaller, but the proportions are the same, giving the shell a much more slender outline than any *iostoma, balteata* or *bandeirana* we have seen.

| Length | Diameter | Aperture | Whorls |
|---|---|---|---|
| 111.6 mm. | 47.0 mm. | 60.0×27.0 mm. | 8 |
| 109.8 | 47.5 | 61.0×27.0 | 7½ |
| 97.4 | 41.5 | 53.0×24.0 | 7 (Fig. 1) |
| 96.8 | 40.0 | 52.0×22.0 | 7 |

**Achatina rugosa chapini,** new subspecies

Figure 2

Similar to *A. rugosa* in appearance and with the same type of sculpture, but the surface more glossy and smoother, owing to the weaker growth-wrinkles. Whorls more rapidly increasing in width, and more convex, giving the shell a broader outline; the aperture also proportionately wider. Olive-ocher to colonial buff; with narrow, irregular, longitudinal, mahogany-brown stripes; sometimes also with broader chestnut-brown longitudinal blotches, more or less curved or broken up. The upper whorls are generally without blotches, more or less pinkish, and in one quite fresh specimen they are beautifully jasper pink.

| Length | Diameter | Aperture | Whorls |
|---|---|---|---|
| 122.0 mm. | 59.0 mm. | 60.0×30.0 mm. | 8 (holotype, Fig. 2) |
| 104.5 | 52.0 | 59.0×27.0 | 7½ |
| 103.0 | 46.8 | 57.0×25.0 | 7½ |
| 102.0 | 46.0 | 55.0×24.0 | 7½ |
| 95.0 | 45.5 | 49.0×24.0 | 7 |

Holotype.—A. M. N. H. No. A6438, from Lukolela, Belgian Congo, September 1930 (J. P. Chapin).

Paratypes.—M. C. Z. No. 93211 and A. M. N. H. No. A6438, two specimens, same data as above. M. C. Z. No. 77018, Lukolela, Belgian Congo, December 17, 1926, one specimen (J. Bequaert). M. C. Z. No. 92992 and A. N. S. P. No. 119545, five specimens, Belgian Congo, without definite locality, but possibly from Lukolela (H. Lang and J. P. Chapin.—These were part of the lot of twenty-four specimens referred by Pilsbry in 1919 to♂ "an undescribed race of *A. rugosa*, or a closely allied species").

On the snail taken alive by the senior author many specimens of the curious wingless phorid, *Wandolleckia biformis* Schmitz, were found running over the animal.

**Achatina bandeirana** Morelet

Figure 3

*Achatina bandeirana* Morelet, 1866, Jour. de Conchyl., XIV, p. 156 (District of Pungo Andongo, Angola); 1867, 'Voy. Welwitsch, Moll. Terr. Fluv.,' (1868), p. 67, Pl. vi, fig. 1 (type; type locality here given more definitely as "Serra de Pedras de Guinga"); 1873, Jour. de Conchyl., XXI, p. 327. Ancey, 1902, Jour. de Conchyl.,

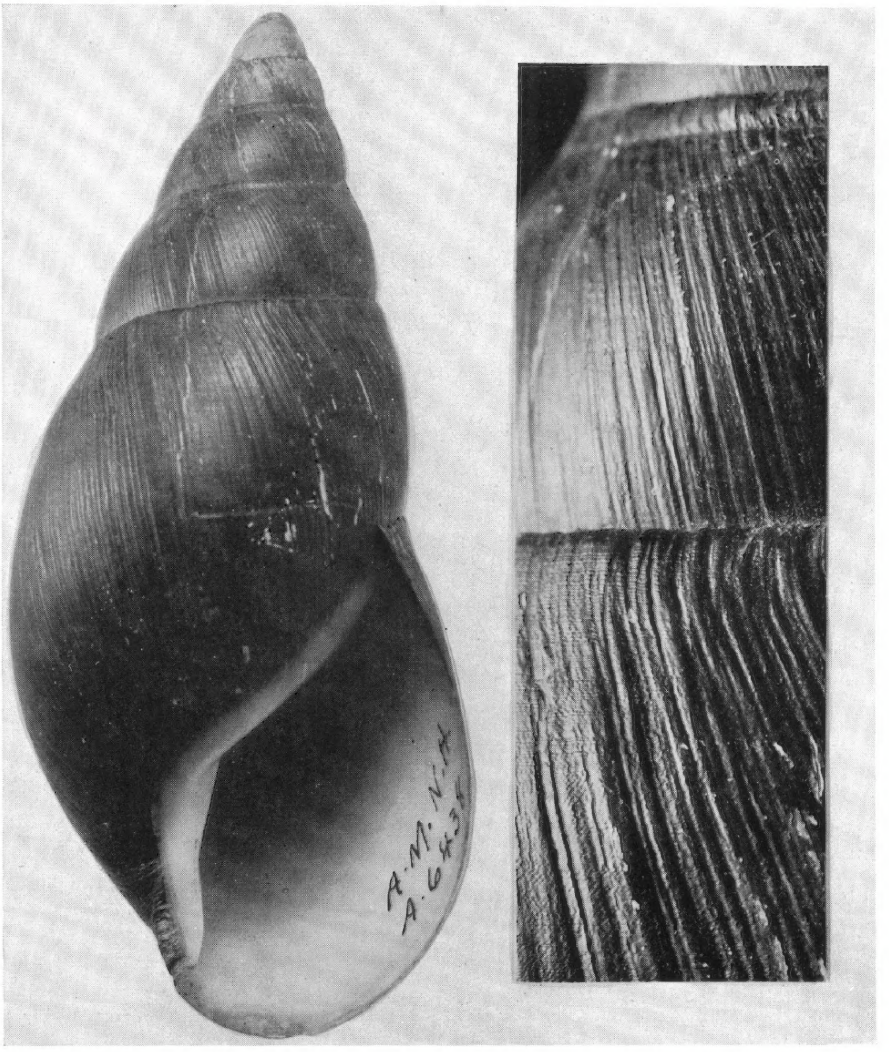

Fig. 2. *Achatina rugosa chapini*, new subspecies. Holotype, A. M. N. H. No. A6438; Lukolela; natural size; and portion of penultimate whorl and of upper half of body whorl, seen ventrally, enlarged × 4.

L, p. 279. PILSBRY, 1919, Bull. Amer. Mus. Nat. Hist., XL, p. 63, Fig. 26, Pl. 1, fig. 3.

*Achatina bandeirana capacior* C. R. BOETTGER, 1927, Abh. Senckenberg. Naturf. Ges., XXXIX, part 4, p. 356, Pl. XV, figs. 14 *a–b* (type; Banana, Belgian Congo).

*Achatina balteata* var. *infrafusca* C. R. BOETTGER, 1913, Ann. Soc. Zool. Malac. Belgique, XLVII (1912), p. 94 (specimens from Banana). Not of E. von Martens, 1897.

SPECIMENS EXAMINED.—Four adult specimens from Kunga, on the Congo estuary, Belgian Congo (H. Lang and J. P. Chapin; part of the lot recorded by Pilsbry in 1919.—M. C. Z.). One adult specimen from near Kisantu, Belgian Congo (L. DeWulf.—M. C. Z.).

The peculiar sculpture of *A. bandeirana* consists, on the body whorl of adult shells, of fine and close vertical (or axial) wrinkles made wavy by numerous, superficial, spiral lines which cut them at regular intervals. Below the suture the waves are much coarser and form low, vertically elongate welts. In addition there are many moderately strong growth-wrinkles. On the earlier whorls the sculpture is more granular. The columella is broad and short, with a long basal truncation.

All the specimens we have seen, as well as those listed and figured by Pilsbry (1919), belong to C. R. Boettger's race *capacior*, which is said to be relatively shorter and broader than Morelet's type, and consequently with the body whorl wider in proportion. Boettger gave the measurements of *capacior* as: length, 104; diameter, 55; aperture, 55×30 mm.; while Morelet's type measured 101 mm. in length and 43 mm. in diameter for 8½ whorls. In our series of shells from Kunga (on the estuary of the Congo, twenty kilometers east of Banana) the proportion of length to width varies considerably, but all are bulkier on the body whorl than Morelet's figures and undoubtedly fall under the definition of *capacior*. The same is true of the specimen from Kisantu. Considering, however, that Morelet saw only two small specimens and that he later referred to *bandeirana* young specimens from Landana (a locality north of the estuary of the Congo), it seems extremely doubtful that *capacior* represents a distinct race. Until a good series of *bandeirana* can be procured from the type locality of the species, we follow Morelet, Pilsbry, and Dautzenberg in referring the shells from the Lower Congo region merely to *bandeirana*.

| LENGTH | WIDTH | APERTURE | WHORLS | |
|---|---|---|---|---|
| 115.5 | 56.0 | 57.0×32.5 mm. | 8 | Kisantu (Fig. 3) |
| 141.0 | 71.0 | 72.5×37.5 mm. | Apex broken | Kunga |
| 115.0 | 60.5 | 62.5×32.0 mm. | 8 | Kunga |
| 125.5 | 66.5 | 66.5×36.0 mm. | 8 | Kunga |

The largest specimen known, 160 mm. in length and 77 mm. in width, was found at Banza Manteka, a locality of the Lower Congo about halfway between Banana and Kisantu. It was recorded by Dautzenberg in 1891.

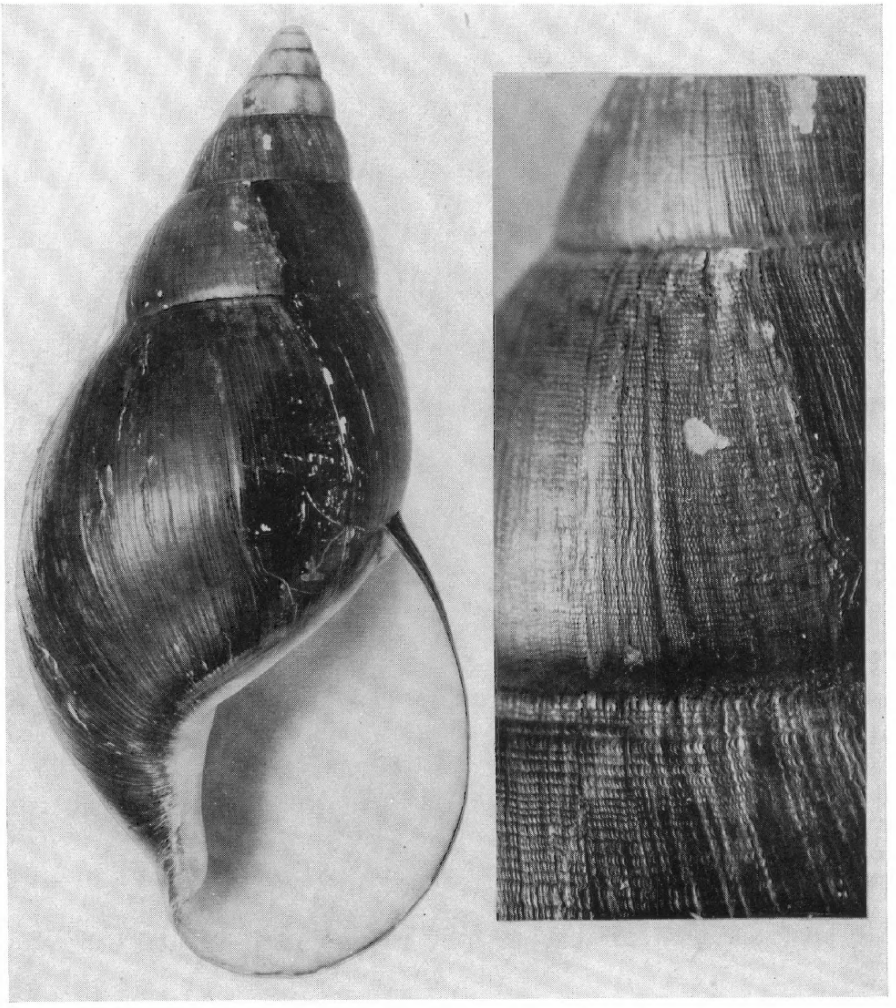

Fig. 3. *Achatina bandeirana* Morelet. M. C. Z. No. 92105; Kisantu; natural size; and portion of penultimate whorl and of upper half of body whorl, seen ventrally, enlarged about × 4.

At Kisantu, Dr. L. De Wulf found phorid flies of the genus *Wandolleckia* living on *Achatina bandeirana*.

*Achatina dohrniana* PFEIFFER, 1870, Mal. Blätter, XVII, p. 29

("Angola"); 1870, 'Novit. Conch.,' IV, p. 1, Pl. CIX, figs. 1–2 (two cotypes), was claimed by H. Dohrn (1873, Mal. Blätter, XXI, p. 79) to be identical with *A. bandeirana* Morelet. This opinion, however, was disputed by Morelet (1873, Jour. de Conchyl., XXI, p. 327; 1874, *op. cit.*, XXII, p. 60), with whom we agree. The strongly concave columella and especially the rather coarse granulation extending over the lower half of the last whorl, as shown in Pfeiffer's figures, are not found in *bandeirana*. As pointed out by Morelet, *A. dohrniana* is related to *A. welwitschi* Morelet, though apparently distinct.

**Achatina balteata** Reeve

Figures 4 and 5

*Achatina balteata* REEVE, 1849 (February), 'Conch. Icon.,' V, *Achatina*, Pl. II fig. 7 (type: "Banks of the River Gambia"). PILSBRY, 1904, 'Man. of Conch.,' (2) XVII, p. 30, Pl. IV, fig. 27; 1919, Bull. Amer. Mus. Nat. Hist., XL, p. 78. GERMAIN, 1913, Bull. Mus. Nat. Hist. Paris, XIX, p. 353, fig. 71 (young shell). DAUTZENBERG, 1921, Rev. Zool. Afric., IX, part 1, p. 87.

*Achatina monetaria* MORELET, 1867, 'Voy. Welwitsch, Moll. Terr. Fluv.,' (1868), p. 63, Pl. VIII, fig. 2 (type: "pays de Selles, dans l'intérieur du district de Novo-Redondo, Angola").

*Achatina balteata* var. *vidaleti* GERMAIN, 1913, Bull. Mus. Hist. Nat. Paris, XIX, p. 354 (without definite locality, but probably from Fort Rousset, French Equatorial Africa).

*Achatina rugosa* PILSBRY, 1919, Bull. Amer. Mus. Nat. Hist., XL, p. 76 (in part; specimens from Ngayu, Belgian Congo). Not of Putzeys, 1898.

SPECIMENS EXAMINED.—Two specimens labelled "Gambia" (M. C. Z.). Four specimens from Bathurst, Gambia (M. C. Z. and Carn. Mus.). Five specimens from Kribi, Cameroon (G. Schwab.—M. C. Z.). Two nearly adult specimens, of 7 whorls, from Lolodorf, Cameroon (A. J. Good.—M. C. Z. and Carn. Mus.). Two specimens from Ngayu, Belgian Congo (Lang and Chapin.—A. M. N. H.) and one possibly from the same locality at the A. N. S. P.

The specimens from Ngayu were referred to *A. rugosa* Putzeys by Pilsbry, but they have the granulose sculpture of *balteata*, which is absent in true *rugosa*.

*A. balteata* is characterized by the peculiar, fine, granulose beading which covers all the whorls. These are described in the original description as "creberrime minute granulatis." On the upper half of the body whorl, right behind the aperture, there are 25 to 30 beads in a vertical stretch one centimeter long. The body whorl of adult shells shows no wavy sculpture, either vertical (radial) or horizontal (spiral), as is present

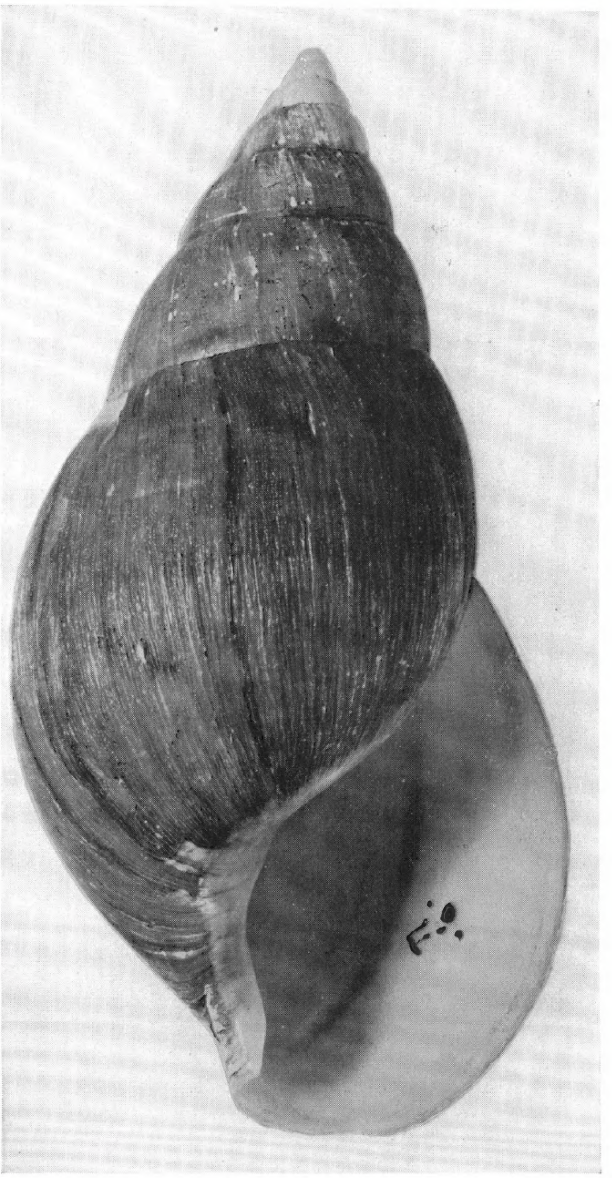

Fig. 4. *Achatina balteata* Reeve. A. M. N. H. No. 1906; Ngayu; natural size.

in *A. rugosa* and *A. bandeirana;* the beading forms incomplete short vertical rows, but it is interrupted by many smooth or irregularly wrinkled areas. In *A. iostoma* the beading is much coarser, the granules being almost twice the size of those of *A. balteata.* In *A. balteata* the beading of the earlier whorls is fairly regular; but on the last it becomes very

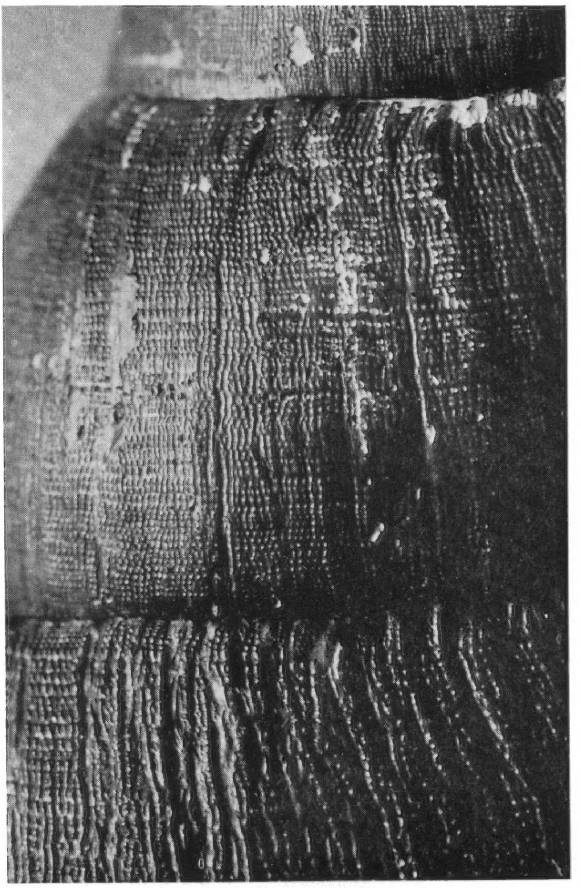

Fig. 5. *Achatina balteata* Reeve. A. M. N. H. No. 1906; Ngayu; portion of penultimate whorl and of upper third of body whorl, seen ventrally, enlarged × 4.

irregular, being much distorted by the coarse growth-wrinkles. The granules are subcircular and placed in incomplete short vertical lines or strings. The arrangement of the beads in spiral chains is much less evident.

Germain's variety *vidaleti* was based upon supposedly adult specimens retaining the pale yellowish-brown color ("teinte d'un jaune marron

clair") and the violaceous columella characteristic of young shells. It does not seem possible to recognize this variety. Our largest specimen from Gambia (138 mm. long) is very pale yellowish-brown throughout, but has only faint purplish blotches on the columella. On the other hand, smaller specimens from Ngayu, while having the columella partly violaceous, are decidedly fulvous over the last two whorls. Much of the color probably depends on the freshness of the shells and on the environment where they were collected, the shells remaining darker in densely shaded spots.

*Achatina monetaria*, of which only the type is known, was apparently based upon an old and somewhat abnormal specimen of *A. balteata*, which Welwitsch also collected in the District of Novo-Redondo. Morelet himself appears to have been doubtful about its validity. Old or bleached specimens of Achatinidae often are heavier than usual, while abnormal specimens are frequently preserved by the natives for domestic use or as curiosities.

| Length | Diameter | Aperture | Whorls | |
|---|---|---|---|---|
| 133.0 | 65.0 | 69.0×38.5 mm. | 9 | Gambia |
| 138.0 | 68.0 | 74.0×40.5 mm. | 9 | Bathurst |
| 120.0 | 60.5 | 61.0×30.5 mm. | 8¾ | Ngayu (Fig. 4) |
| 114.0 | 57.5 | 64.0×34.5 mm. | 7½ | Ngayu |
| 124.0 | 62.0 | 65.5×36.5 mm. | 7¾ | ?Ngayu |

**Achatina balteata** variety **infrafusca** E. von Martens

Figure 6

*Achatina dimidiata* E. von Martens, 1889, 'Conch. Mitth.,' III, parts 1–2, p. 17, Pl. xlii, figs. 1–1*a* (type; "ad oram Fl. Gabun," French Congo). Not of E. A. Smith, 1878.

*Achatina infrafusca* E. von Martens, 1897, 'Deutsch Ost-Afr., IV, Besch. Weichth.,' p. 89 (new name for *A. dimidiata* E. von Martens, 1889).

*Achatina balteata* var. *infrafusca* Pilsbry, 1904, 'Man. of Conch.,' (2) XVII, p. 32, Pl. iv, figs. 22–23.

Specimens Examined.—One specimen from Lukolela, Belgian Congo (J. P. Chapin.—A. M. N. H.). Four specimens from the Gaboon (M. C. Z. and A. N. S. P.). Two specimens from Lambarene on the Ogowe River, Gaboon (Mrs. L. Russell.—A. N. S. P.).

This variety is characterized by the pronounced, more or less wavy, chestnut stripes which extend over all the whorls, but are lacking on the lower half of the last whorl. In the typical form, only the early whorls have a few vertical chestnut blotches. Moreover, as Pilsbry has pointed out, there are transitional specimens. It has been claimed that *infra-*

*fusca* has also a proportionately shorter and broader shell than typical *balteata;* but this is not borne out by E. von Martens' measurements of the type of *infrafusca* (length, 120; width, 60; aperture, 59×32 mm.), nor by specimens we have seen.

According to Dr. J. P. Chapin's notes, the living specimen which he photographed at Lukolela (Fig. 6) had the dorsal surface of the extended

Fig. 6. Living *Achatina balteata* var. *infrafusca* E. von Martens. Lukolela. Photograph by J. P. Chapin.

animal behind the shell light yellowish-gray, shading to blackish on head and tentacles.

The variety *infrafusca* does not seem to be geographically segregated and is hardly worth retaining. Among the specimens listed above from Bathurst, Gambia, one is intermediate between the typical coloration and the variety *infrafusca*, having on the body whorl a series of chestnut streaks faintly confluent at the periphery into a spiral band which becomes more pronounced behind the outer lip.

| Length | Width | Aperture | Whorls | |
|---|---|---|---|---|
| 152.0 | 68.5 | 75.0×37.0 mm. | 9 | Lukolela (Fig. 6) |
| 137.5 | 70.0 | 70.0×39.0 mm. | 9 | Gaboon |
| 116.0 | 61.0 | 63.0×31.5 mm. | Apex broken | Lambarene |

**Achatina iostoma** Pfeiffer

Figure 7

*Achatina iostoma* Pfeiffer, 1854, Proc. Zool. Soc. London, (1852), p. 86 (Fernando Po); 1867, 'Conch.-Cab.,' I, Abt. 13, part 1, p. 360, Pl. xliii, fig. 7 (type from the Cuming Collection). Pilsbry, 1904, 'Man. of Conch.,' (2) XVII, p. 32, Pl. xvii, fig. 18, and Pl. xlii, fig. 10.

*Callistoplepa tiara* Preston, 1900, Ann. Mag. Nat. Hist., (5) VI, p. 183, Pl. vi, fig. 9 (type; Bitye [misspelled Bitze], near the River Ja, Cameroon).

*Achatina gruveli* Dautzenberg, 1921, Rev. Zool. Afric., IX, p. 91, Pl. vi, figs. 1–2 (type; Yaunde, Cameroon, at 780 m. altitude).

Specimens Examined.—Two adult shells from Elalawa (Elat), Cameroon (A. N. S. P.). One adult and six young shells from Yaunde, Cameroon (A. N. S. P.; M. C. Z.). Two adult shells from Metet, Cameroon (A. J. Good.—M. C. Z.). One adult shell from Bipindi, Cameroon (A. J. Good.—Carn. Mus.). One adult shell from Efulen, Cameroon (A. N. S. P.).

Although originally described from the Cuming Collection as coming from Fernando Po, *A. iostoma* has never again been taken on that island and the type locality is extremely doubtful. The species is known with certainty from western Cameroon only, where it is common in many localities.

*A. iostoma* is readily distinguished from *A. balteata* by the much coarser, very tangible, beaded sculpture, which covers more uniformly the entire surface of the shell. The beads are placed in regular spiral and slightly confluent, vertical rows over the entire width of the body whorl. Some eighteen to twenty beads may be counted on the upper half of the body whorl, right behind the aperture, in a vertical stretch of one centimeter.

| Length | Width | Aperture | Whorls | |
|---|---|---|---|---|
| 126.0 | 61.0 | 68.0×34.5 mm. | 8 | Metet (Fig. 7) |
| 125.5 | 59.0 | 69.0×32.5 mm. | 8 | Metet |
| 119.0 | 60.0 | 68.0×34.0 mm. | 8 | Elalawa |
| 117.0 | 55.5 | 72.0×31.0 mm. | 8 | Elalawa |
| 126.0 | 64.5 | 67.0×36.5 mm. | 8 | Yaunde |

As pointed out by Dupuis [1923, Ann. Soc. Zool. Belgique, LIII (1922), p. 81], *Callistoplepa tiara* Preston was based upon a young *Achatina*. We do not hesitate in referring it to *A. iostoma*. We have before

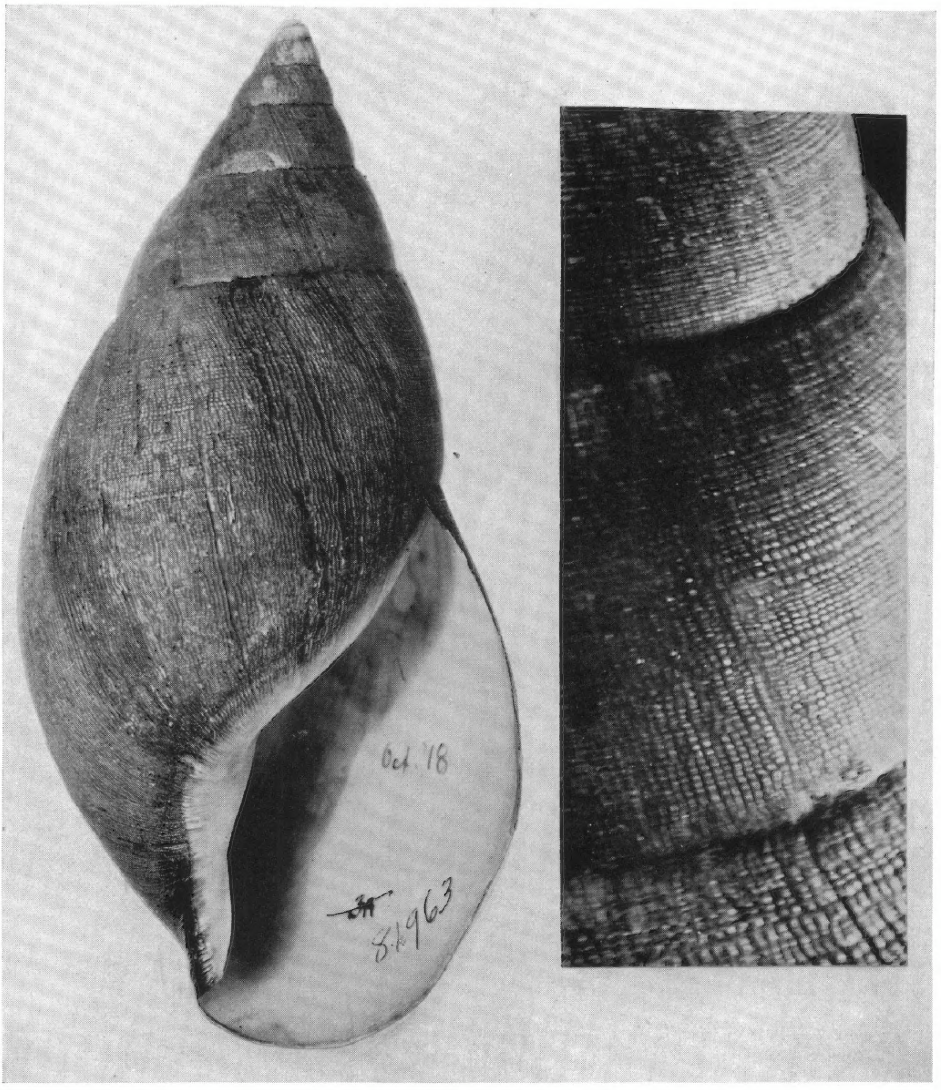


Fig. 7. *Achatina iostoma* Pfeiffer. M. C. Z. No. 81963; Metet; natural size; and portion of penultimate whorl and of upper half of body whorl, seen ventrally, enlarged about × 4.

us a young shell of that species (55 mm. long, of 6 whorls), from Yaunde, which agrees in every detail with Preston's description and figure. Bitye is on the Ja River, about seventy miles to the southeast of Yaunde.

Some of our specimens of *A. iostoma* agree in every respect with Dautzenberg's figures and description of his *A. gruveli*, which, in our opinion, was based upon young specimens of *iostoma* (95 mm. long, of 7 whorls). As yet we have seen no true cotypes of *gruveli;* but specimens referred to that species at the A. N. S. P. (some of them apparently named by Dautzenberg) are certainly young *iostoma*. They have the "hydrophanous" streaks mentioned by Dautzenberg for *gruveli;* but such streaks are often present in true *iostoma*, as well as in related species (for instance, in *A. bandeirana*).

**Achatina hessei** C. R. Boettger

*Achatina hessei* C. R. BOETTGER, 1913, Proc. Malac. Soc. London, X, part 6, p. 350, Pl. XVII, fig. 1 (type; "Yaunde, southern Cameroons").

*?Achatina iostoma* DAUTZENBERG, 1921, Rev. Zool. Afric., IX, p. 89. Not of Pfeiffer, 1854.

We are as yet unable to understand this species, which is known only from the type locality. So far as can be gathered from the description, Boettger saw only one specimen. He compared his new species with *A. balteata*, but made no reference to *A. iostoma*.

At the A. N. S. P. there are, under the name *A. hessei*, four dead, very poorly preserved specimens from Yaunde, Cameroon, received from P. Hesse, and labelled "topotypes; part of original lot." There is, however, no evidence that they were ever seen by Boettger. In these specimens the beading is decidedly coarser than in *A. iostoma* of approximately the same size and from the same locality. A young specimen, with similar very coarse sculpture, was sent from the southern Cameroon by G. Schwab (M. C. Z. No. 72306); we refer it provisionally to *A. hessei*.

Additional material may prove that *A. hessei* merely represents an extreme variation in sculpture of *A. iostoma*.

The shells from Yaunde, which Dautzenberg referred to *iostoma*, possibly may have been *hessei*, the description of which he seems to have overlooked. He states that "Son test est beaucoup plus mince que celui de l'*A. balteata;* la surface des derniers tours est entièrement couverte de granulations beaucoup plus fortes et disposées en séries longitudinales irrégulières qui bifurquent, puis se rejoignent et forment ainsi, par places, des losanges allongés. La spire s'élargit aussi plus

rapidement que chez l'*A. balteata* et le dernier tour, plus haut en proportion, est aussi plus ventru." Most of these peculiarities agree better with *A. hessei* than with *A. iostoma.* Moreover, we believe that Dautzenberg redescribed the true *A. iostoma,* in the same paper, as *A. gruveli.*